

## WHAT IS CLAIMED IS:

1. A process of preparing a semiconductive film comprising:  
 applying a solution containing a soluble polymer and a soluble metal precursor onto  
 a substrate to form a polymer and metal containing layer thereon;  
 treating said substrate including said polymer and metal containing layer for a time  
 5 to form a coherent composite film;  
 heating said substrate in an oxygen-containing atmosphere at temperatures  
 characterized as sufficient to remove said polymer from said composite film and form a  
 metal oxide film; and,  
 reacting said metal oxide film with a sulfur-, selenium- or tellurium-containing gas  
 10 under conditions sufficient to form a semiconductive film.
2. The process of claim 1 wherein said solution is an aqueous solution having a  
 pH of from about 4 to about 7.
3. The process of claim 1 wherein said semiconductive film contains a single  
 metal selected from the group consisting of cadmium, indium, zinc, copper and titanium.
4. The process of claim 1 wherein said metal oxide film is cadmium oxide and  
 said semiconductive film is selected from the group consisting of cadmium sulfide,  
 cadmium selenide, cadmium telluride or mixtures thereof.
5. The process of claim 2 wherein said process is organic-solvent free.
6. The process of claim 1 wherein said metal oxide film is zinc oxide and said  
 semiconductive film is selected from the group consisting of zinc sulfide, zinc selenide,  
 zinc tellenide or mixtures thereof.
7. The process of claim 1 wherein said semiconductive film is a dye-sensitized  
 titanium oxide film.
8. The process of claim 1 wherein said metal oxide film is a mixed metal oxide  
 selected from the group consisting of zinc and cadmium, copper and indium, copper and  
 gallium, cadmium and indium, and copper, gallium and indium.
9. The process of claim 8 wherein said semiconductive film is selected from  
 the group consisting of zinc cadmium sulfide, zinc cadmium selenide, zinc cadmium  
 telluride or mixtures thereof.

10. The process of claim 8 wherein said semiconductive film is selected from the group consisting of copper indium sulfide, copper indium selenide, copper indium telluride or mixtures thereof.

11. The process of claim 8 wherein said semiconductive film is selected from the group consisting of cadmium indium sulfide, cadmium indium selenide, cadmium indium telluride or mixtures thereof.

12. The process of claim 8 wherein said semiconductive film is selected from the group consisting of copper gallium sulfide, copper gallium selenide, copper gallium telluride or mixtures thereof.

13. The process of claim 8 wherein said semiconductive film is copper gallium indium selenide.

14. The process of claim 1 wherein said soluble polymer is selected from the group consisting of poly(vinyl alcohol), polyethylene glycol, poly(acrylic acid), poly(diallyldimethyl ammonium chloride), and polyethylenimine.

15. The process of claim 1 wherein said soluble polymer is polyvinyl alcohol.

16. The process of claim 1 wherein said soluble precursor includes a combination of.

17. The process of claim 1 wherein said treating includes drying at temperatures characterized as insufficient to remove said polymer but sufficient to form the coherent composite film.

18. A composition of matter comprising a solution of a water-soluble metal compound and a water-soluble polymer, said solution having a pH of from about 4 to about 7 and characterized as organic-solvent free.

19. The composition of claim 18 wherein said water-soluble polymer is selected from the group consisting of polyvinyl alcohol, polyethylene glycol, poly(acrylic acid), poly(diallyldimethyl ammonium chloride), and polyethylenimine.

20. The composition of claim 18 wherein said water-soluble metal contains a single metal selected from the group consisting of cadmium, indium, zinc, copper, gallium and titanium.